PATENT COOPERATION TF ATY

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	10.09.2002
Applicant's or agent's file reference 6871-123	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US01/07392	06/03/2001	07/03/2000

Applicant
PRICEWATERHOUSECOOPERS L.L.P.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

For the purpose of deciding whether the claimed invention is patentable or not, the elected Offices may apply criteria additional to or different from the criteria on which the international preliminary examination report is based (see Articles 27(5), 33(5)). Additional criteria may include e.g. exemptions from patentability and the requirements of enabling disclosure and of clarity and support of claims.

Name and mailing address of the IPEA/	Authorized officer
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Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 6871-123	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US01/07392	International filing date *(day/month/year)* 06/03/2001	Priority date *(day/month/year)* 07/03/2000
International Patent Classification (IPC) or national classification and IPC G06F17/00		
Applicant PRICEWATERHOUSECOOPERS L.L.P.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand 17/09/2001	Date of completion of this report 10.09.2002
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Bowler, A Telephone No. +31 70 340 4473

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US01/07392

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1,3,5,6,8-29, 31-44	as originally filed				
2,4,7,30	as received on	17/07/2002	with letter of	12/07/2002	

Claims, No.:

1-16	as received on	17/07/2002	with letter of	12/07/2002

Drawings, sheets:

1/7-7/7	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. **The amendments have resulted in the cancellation of:**

☐ the description, pages:
☒ the claims, Nos.: 7-9
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1,2,12,13
	No:	Claims	3,4-6,14-16
Inventive step (IS)	Yes:	Claims	1,2,10,11,12,13
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-6,10-16
	No:	Claims	

2. Citations and explanations
   see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: EP-A-0 854 431 (IBM) 22 July 1998 (1998-07-22)
D2: US-A-5 890 130 (SNYDER KATHLEEN MARIE ET AL) 30 March 1999 (1999-03-30)
D3: EP-A-0 831 398 (IBM) 25 March 1998 (1998-03-25)
D4: DEWAN R ET AL: 'Workflow optimization through task redesign in business information processes' SYSTEM SCIENCES, 1998., PROCEEDINGS OF THE THIRTY-FIRST HAWAII INTERNATIONAL CONFERENCE ON KOHALA COAST, HI, USA 6-9 JAN. 1998, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 6 January 1998 (1998-01-06), pages 240-252, XP010262920 ISBN: 0-8186-8255-8

2. Claims 3, 4-6 and 14-16 are held to be lacking in novelty over the disclosure of D2 and D1. Claims 4,16 define nothing more than the representation of an already existing workflow, which is broken down into lowest level activities and means for "synthesizing" associated workflows and summary activities. Here synthesizing is read as being the same as modelling, since applicant is not actually synthesizing a workflow, rather applicant seeks to represent the subactivities which define an existing workflow or process. The system and method steps appearing in Claims 4 and 14 are disclosed in D1 at col. 9 line 2, to col. 10, line 30.

3. Claims 3, 4, 5, 6, 14, 15, 16 are not seen to be novel in view of D2, which in addition to the Workflow Management Breakdown and analysis of claims 3, 4 and 16, includes the limitations of mans for linking instructional content with each activitiy, and viewing the outcomes of generated project WBS and associated workflows. Graphical representation and verbal descriptions of communications or others actions between the participants are disclosed by D2 figure 14,15 which can be interpreted to read on linking of instructional content and viewing outcomes of a generated project WBS and related workflows as set forth in claims 5,6,15,16.

4. Claims 1, 2, 12, 13 appear to satisfy the criteria of the Patent Cooperation Treaty as regards novelty and inventive step. Claims 10 and 11 appear to satisfy the requirement for inventive step.

bodies of knowledge involved, without having the benefit of expertise in all of the disciplines or professions.

SUMMARY OF THE INVENTION

The invention comprises a method, process and system for synthesizing an optimized process flow, an activity abstraction hierarchy and an instruction set that represents the minimal work to produce at least one outcome. An embodiment of this invention utilizes a single set of non-redundant activities and activity dependencies, which has already been derived from an organization's current processes and procedures, to produce an optimized work flow with respect to the desired outcomes for a project. To accomplish this, the conditional execution requirements of each activity required to produce a specified outcome are recursively examined to identify the set of activities which must be completed to arrive at the outcome. Starting with the last of these activities, a determination is made as to whether the activity is already present in the subject project work plan. If the activity is not present, but should be, it is inserted into its correct position in the project's work breakdown structure and is linked into the work flow for each predecessor and successor activity already present in the project's work breakdown structure. Working upstream along the process chain from that identified last activity, the process of activity insertion/positioning and work flow linking continues until all activities in the process chain of the outcome have been considered for insertion. Higher level summary activities are also introduced into the project's work breakdown structure as the lowest-level activities are inserted by referencing a designated work breakdown structure template.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

Figure 1 is a block diagram illustrating an embodiment of the outcome-driven work planning system;

Figure 2 shows the entity relationship diagram for an embodiment of the planning system data repository;

Figure 6c is an exemplary project WBS and work flow that is populated with sample data following second execution of step 4.1;

Figure 6d is an exemplary project WBS and work flow that is populated with sample data following third execution of step 4.1;

Figure 7a shows an exemplary project WBS and work flow used as the starting point for Example 3: Outcome-Driven Work Flow Reduction Process (i.e., before the reduction of Outcome O2);

Figure 7b shows an exemplary project WBS and work flow resulting from the execution of procedure 5 from Example 3: Outcome-Driven Work Flow Reduction Process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following description is of the best mode presently contemplated for carrying out the invention. This description is not to be taken in a limiting sense, but is merely made for the purpose of describing the general principles of the invention. The scope of the invention should be determined with reference to the claims.

This mode may be characterized as a rule-based approximation, synthesis, and reduction approach. The planner may start synthesis and reduction with either an empty plan or with a plan that approximates the anticipated final work breakdown structure and work flow required for the scope of the project being planned. The approximation can be chosen from a set of known and useful "stock" plans. A "stock" plan is a previously constructed work breakdown structure (WBS) and work flow (with component activities linked to appropriate instructional content), which have proven useful on past projects. Each stock plan describes the work necessary to achieve one or more outcome. In the synthesis and reduction approach one develops a custom work flow by synthesizing the work flows necessary to achieve desired outcomes not present in the plan and by de-synthesizing, or reducing, the plan's work flows by removing activities that are solely required for outcomes which are currently present in the plan, but which are not wanted.

A process and system is disclosed to assist work planners by assembling a work breakdown structure (WBS) and work flow for a project based on the explicit selection or de-selection of outcome(s) by a work planner from a defined set of

Outcome -a defined result of a process (e. g., a manufactured part or final product, an architectural drawing, a conceptual model, a decision made, a judgement rendered, a presentation delivered, a state of being achieved).

Project -an organized undertaking to produce or accomplish one or more desired outcome from a set of possible outcomes.

Project Activity -represents the use of an elementary activity or non-elementary activity by a project.

Project Activity Dependency -represents the use of an elementary activity dependency in the workflow for a project.

Project Planning -a discipline focused on determining, structuring, and scheduling the minimum work necessary to produce the outcome(s) defined for the scope of the project in the least amount of time under known constraints (e. g., resource availability, regulatory requirements).

WBS Activity -defines the use and positioning (i. e., vertical positioning and indention level) of an activity in a WBS template.

WBS Template -a named hierarchical structure used as a pattern for organizing project activities into a work breakdown structure (WBS).

Work Breakdown Structure (WBS)-a hierarchy of project activities used to view and manage the work of a project at different levels of abstraction.

Work Flow -a network of interdependent elementary activities that terminates in the elementary activity associated with the production of an outcome.

This workflow development process is designed for use on large-scale projects, including analysis of business strategies, such as where to go with new product development, or reorganization of a large-scale enterprise (e.g. large corporation). Therefore, the results of the workflow development process must be without error and must be capable of handling inputs from disparate sources, e.g., in a corporation, from a research and development unit or division, a manufacturing unit or division, a human resources unit or units, an upper management oversight unit and a reorganization plan (simultaneously with a reorganization of the corporation for carrying out the major project). The workflow development must be done in a manner such that the risk to the enterprise utilizing the work flow development

Following seventh execution of procedure 4.4:

Node Processing Table - 114

Entry Seq. #	Node ID	Grouping Indicator	Processed Indicator	Removal Indicator
1	EA B1.3	N	Y	N
2	EA B1.2	N	Y	N
3	EA B1.1	N	Y	N
4	EA A2.1	N	Y	N
5	EA A1.3	N	Y	N
6	EA A1.2	N	Y	N
7	EA A1.1	N	Y	N

Procedure 4.4 detected no remaining unprocessed nodes in the Node Processing Table. This condition causes the termination of synthetic processing.

EXAMPLE 2 of the Outcome-Driven Work Flow Synthesis Process

In this example, after having selected outcome O3 and seeing the results in the Project WBS/Work Flow from EXAMPLE 1, above, the user decides to add Outcome O4. This illustrates how to synthesize an additional outcome into an existing Project WBS/Work Flow. It also shows the special processing associated with an Elementary Activity classified as a "grouping" activity. The notation follows that of EXAMPLE 1, above. Figure 6a provides an exemplary Project WBS and work scope of the controlling WBS used for this example.

Procedure 1

Elementary activity EA C 1.3 produces the outcome that the user (work planner) wants to add to the project (i. e., Outcome O4), so it is selected from the Planning System Data Repository **28** (Figure 1).

CLAIMS

WHAT IS CLAIMED IS:

1. A process for generating a project work breakdown structure (WBS) and related work flows, comprising the steps of:

(a) selecting an existing project WBS, said existing project WBS having related work flows;

(b) selecting at least one desired outcome for synthesis, said at least one selected desired outcome having a first associated work flow comprising a network of interdependent activities; and

(c) synthesizing said first associated work flow with said existing project WBS and its related work flows by:

(c_1) identifying the most downstream activity in said first associated work flow;

(c_2) determining whether each activity in said first associated work flow is already present in the project WBS and related work flows being generated by starting with the most downstream activity in said first associated work flow and working upstream until all activities in said first associated work flow have been compared to the activities of the project WBS and related work flows being generated;

(c_3) adding any activity in said first associated work flow which is not already present in the project WBS and related work flows being generated;

(c_4) adding activity dependencies which should exist between any of said added activities and any activity already present in the project WBS and related work flows being generated; and

(c_5) introducing summary activities, when required, into the project WBS being generated when lowest-level activities from said first associated work flow are added.

2. The process of claim 1, further comprising the steps of:

(d) selecting at least one undesired outcome for de-synthesis, said at least one selected undesired outcome having a second associated work flow comprising a network of interdependent activities; and

(e) de-synthesizing said second associated work flow from the project WBS and related work flows being generated by:

(e_1) identifying the most downstream activity in said second associated work flow;

(e_2) determining whether each activity in said second associated work flow is also part of the work flows associated with desired outcomes which are already present in the project WBS and related work flows being generated by starting with the most downstream activity in said second associated work flow and working upstream until all activities in said second associated work flow have been evaluated;

(e_3) removing any activity and activity dependency which are not needed as part of the work flows associated with the remaining desired outcomes for the project WBS and related work flows being generated; and

(e_4) removing summary activities, as appropriate, from the project WBS being generated as lowest-level activities from said second associated work flow are being removed.

3. A process for generating a project work breakdown structure (WBS) and related work flows representing the minimal work to produce at least one desired outcome, said process comprising the steps of:

(a) viewing a set of available WBS templates;

(b) viewing a set of outcomes within and outside the scope of each WBS template from said set of available WBS templates;

(c) selecting a controlling WBS template from said set of available WBS templates for a project WBS;

(d) selecting at least one desired outcome from said set of outcomes for synthesis, said at least one selected desired outcome having a first associated work flow;

(e) synthesizing said first associated work flow with the project WBS according to said selected controlling WBS template;

(f) viewing the project WBS and related work flows being generated; and

(g)linking each activity of the project WBS being generated with appropriate instructional content.

4. A system for generating a project work breakdown structure (WBS) and related work flows comprising:

(a) means for accepting as input an existing project WBS and at least one desired outcome, said existing project WBS having related work flows;

(b) means for storing said existing project WBS and related work flows;

(c) means for storing a set of activities associated with a set of pre-defined WBS templates;

(d) means for identifying lowest level activities and their interdependencies from said stored set of activities necessary to produce said at least one desired outcome, said identified lowest level activities and interdependencies defining an associated work flow; and

(e) means for synthesizing said associated work flow and appropriate summary activities with said existing project WBS and its related work flows.

5. The system of claim 4, further comprising means for linking instructional content with each activity.

6. The system of claim 5, further comprising means for viewing outcomes of a generated project WBS and related work flows.

7. (canceled)

8. (canceled)

9. (canceled)

10. The process of claim 3, further comprising the step of selecting at least one undesired outcome from said set of outcomes for de-synthesis after step (f), said at least one selected undesired outcome having a second associated work flow.

11. The process of claim 10, further comprising the step of de-synthesizing said second associated work flow from the project WBS and related work flows being generated by referencing said selected controlling WBS template.

12. A process for generating a project work breakdown structure (WBS) and related work flows, comprising the steps of:

(a) selecting a controlling WBS template for a project WBS;

(b) selecting at least one desired outcome for synthesis, said at least one selected desired outcome having a first associated work flow comprising a network of interdependent activities; and

(c) synthesizing said first associated work flow with the project WBS and related work flows being generated according to said selected controlling WBS template by:

(c_1) identifying the most downstream activity in said first associated work flow;

(c_2) determining whether each activity in said first associated work flow is already present in the project WBS and related work flows being generated by starting with the most downstream activity in said first associated work flow and working upstream until all activities in said first associated work flow have been compared to the activities of the project WBS and related work flows being generated;

(c_3) adding any activity in said first associated work flow which is not already present in the project WBS and related work flows being generated;

(c_4) adding any activity dependency which should exist between any of said added activities and any activity already present in the project WBS and related work flows being generated; and

(c_5) introducing summary activities, as appropriate, into the project WBS being generated when lowest-level activities from said first associated work flow are added.

13. The process of claim 12, further comprising the steps of:

(d) selecting at least one undesired outcome for de-synthesis, said at least one selected undesired outcome having a second associated work flow comprising a network of interdependent activities; and

(e) de-synthesizing said second associated work flow from the project WBS and related work flows being generated by:

(e_1) identifying the most downstream activity in said second associated work flow;

(e_2) determining whether each activity in said second associated work flow is also part of the work flows associated with desired outcomes which are already present in the project WBS and related work flows being generated by starting with the most downstream activity in said second associated work flow and working upstream until all activities in said second associated work flow have been evaluated;

(e_3) removing any activity and activity dependency which are not needed as part of the work flows associated with the remaining desired outcomes for the project WBS and related work flows being generated; and

(e_4) removing summary activities, as appropriate, from the project WBS being generated by referencing said selected controlling WBS template as lowest-level activities from said second associated work flow are being removed.

14. A system for generating a project work breakdown structure (WBS) and related work flows comprising:

(a) means for accepting as input a controlling WBS template for a project WBS and at least one desired outcome;

(b) means for storing said controlling WBS template;

(c) means for storing a set of activities associated with a set of pre-defined WBS templates;

(d) means for identifying lowest level activities and their interdependencies from said stored set of activities necessary to produce said at least one desired outcome, said identified lowest level activities and interdependencies defining an associated work flow; and

(e) means for synthesizing said associated work flow and appropriate summary activities with the project WBS and related work flows being generated according to said controlling WBS template.

15. The system of claim 14, further comprising means for linking instructional content with each activity.

16. The system of claim 15, further comprising means for viewing outcomes of a generated project WBS and related work flows.